

Date: Fri, 20 Aug 93 20:42:11 PDT
From: Info-Hams Mailing List and Newsgroup <info-hams@ucsd.edu>
Errors-To: Info-Hams-Errors@UCSD.Edu
Reply-To: Info-Hams@UCSD.Edu
Precedence: Bulk
Subject: Info-Hams Digest V93 #997
To: Info-Hams

Info-Hams Digest Fri, 20 Aug 93 Volume 93 : Issue 997

Today's Topics:

 'Diversity Operation'? (3 msgs)
 ARRL DX Bulletin 044
 A strange thing that happens when you are learning code
 Connectors? UHF NMO N PL-259/SO-239 ...
 Daily Solar Geophysical Data Broadcast for 19 August
 FCC Collins 851S-1 and 851S-2 receivers (2 msgs)
 If I call FCC, can they tell me what my new call is?
 I NEED HELP!!! I tried fixing a 02AT and made it worse!!!
 Phase Linked retransmissions
 QSL routes needed
 TR 18 rotator?
 VE session(s) in Tucson, AZ?

Send Replies or notes for publication to: <Info-Hams@UCSD.Edu>
Send subscription requests to: <Info-Hams-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Info-Hams Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/info-hams".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: 19 Aug 93 13:12:11 EDT
From: psinntp!arrl.org@uunet.uu.net
Subject: 'Diversity Operation'?
To: info-hams@ucsd.edu

In rec.radio.amateur.misc, wtr@mitre.org (Bill Ralston) writes:
>In article <24tahfINN5g3@golem.wcc.govt.nz>, gardner_a@kosmos.wcc.govt.nz
>(andy gardner) wrote:
>>
>> There are (to my knowledge), 4 different methods of diversity reception,
>[...]

>> 1. Frequency diversity
>> 2. Space diversity
>> 3. Polarization diversity
>> 4. Time diversity
>
>[descriptions deleted]
>
>Add, angle diversity, which is used on microwave troposcatter links...

Don't forget Cultural Diversity, which is common on most HF bands.

CUL es 73 de BB

```

"
Brian Battles, WS10      I Tel      203-666-1541, ext 222 I  "Radio amateurs
QST Features Editor    I Fax      203-665-7531      I    do it with
ARRL HQ                I Internet bbattles@arrl.org  I    high frequency"
Newington, CT USA      I Amprnet  ws1o@ws1o.ampr.org  I
"

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Date: Wed, 18 Aug 1993 23:16:26 GMT
From: dog.ee.lbl.gov!overload.lbl.gov!agate!spool.mu.edu!olivea!sgigate!sgiblab!
wiretap.Spies.COM!wicat!keithm@network.ucsd.edu
Subject: 'Diversity Operation'?
To: info-hams@ucsd.edu

I once owned a car with an FM stereo receiver that used diversity reception. The car had two antennas: one normal vertically polarized cowl mount. The other was a horizontally polarized wire antenna embedded in the rear window. The stereo would sample both antennas and switch to whichever had the best signal. I had almost no problem with "mobile flutter".

It would sometimes get confused when I transmitted on 2m and start switching at a fast rate causing a loud squeal to come from the speakers.

--

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Keith McQueen, Wicat Systems Inc. , (801)223-3284      | My opinions are |
Packet:      n7hmf @ nv7v.UT.USA.NA                    | all mine...     |
Internet:    keithm@wicat.com                          | ...so there!    |

```

Date: 19 Aug 93 15:30:46 GMT
From: dog.ee.lbl.gov!overload.lbl.gov!agate!howland.reston.ans.net!noc.near.net!

transfer.stratus.com!jjmhome!pig!die@network.ucsd.edu
Subject: 'Diversity Operation'?
To: info-hams@ucsd.edu

In article <1993Aug17.015547.26921@bnr.ca> markus@pinetree.org writes:
>I am wondering about 'Diversity operation'. My shortwave receiver has an
>allusion to it in the manual; it involves tying the final IF of two receivers
>together and tuning them both to the same station. My guess is that two
>physically separated antennas are involved and the intended benefit is to
>reduce selective carrier fading.

Diversity reception is a technique to take advantage of the fact the many kinds of radio fading are due to interference (Ralliagh fading - interference in the physics sense of the word) between signals traveling slightly different paths from the transmit antenna to the receiver antenna. This results in an rf field that has local maximums where the waves add in phase and local minimums where they cancel. In the case of both skywave propagation and many kinds of microwave atomospheric propagation changes in the medium (the ionosphere or even the lower atmosphere in the case of tropo propagation) cause one or more of the radio paths to change slightly in delay or amplitude which causes the locations of the minimums and maximums to shift with time.

This shifting of the wave paths causes the signal as observed at one point in the wave pattern (the receive antenna) to vary in amplitude as the multiple paths change from adding to cancelling at that point. This causes fading. When the path differences are great enough (milliseconds - typical of HF propagation) this cancellation may take place only at one frequency and signals at nearby frequencies may have enough different phase to add. This causes selective fading where signals at one frequency fade differently than those at nearby frequencies (such as the carrier of an AM signal fading when the sidebands don't or the mark signal of a fsk transmission fading when the space signal doesn't).

Some clever fellow discovered many many years ago that for HF signals which are often propagated by several paths (multiple layers or pockets of ionization in the ionosphere) the rf field is complex enough so signals observed at rather closely spaced points (less than a few wavelengths apart) often fade quite independantly of each other. This lead to the notion of space diversity reception, where signals from multiple receivers fed from antennas spaced a few wavelength or so apart are combined in some kind of post detection combining circuit which gives greater weight to the stronger signal. Some such combiners (widely used on VHF/UHF fm repeaters to handle multipath flutter fading from mobile users) simply switch to the receiver providing the stronger signal at the instant, others combine in proportion to the square of the ratio of the signal strengths.

The whole notion is that when one receiver sees a fade the other(s) will often not be seeing a fade and will still be providing good signal. By selecting s receiver with a good signal, a nearly continuous feed of the information is possible even if each receiver is seeing good data only intermittantly.

A common configuration for space diversity at HF is for two identical receivers tuned to the same frequency but fed from different antennas to be cross connected so the AGC voltage of both receivers is controlled by the receiver getting the stronger signal. Outputs are combined in some kind of diversity combiner (often part of an rtty terminal unit or modem). Many sophisticated HF receivers intended for military or commercial use include provisions for such AGC cross strapping.

It is important to note that the information is combined *after* detection. It is not sufficient to merely connect two antennas together or even the IF of two receivers together, because the carrier waves present will combine in the same way signals at an antenna do - they will interfere with each other and add or cancel depending on relative phase. This is equivalent to what happens at the antenna with signals from different paths (principle of superposition) and simply produces the same kind of fading as seen at the antennas (sometimes worse). In the case of RTTY, this means that effective space diversity operation requires two separate audio filters and detectors with combining taking place at the DC outputs of the detectors.

It is also possible to send the same information on multiple frequencies and combine receivers tuned to all of them (so called frequency diversity which does not require separate antennas), and also combine receivers with antennas having different polarizations (often used at HF and on microwave links).

> Anyone care to reminisce about practical use of this technique? Is it still
> used or has it been obsoleted by SSB?
>

What you are talking about is called space diversity (or maybe polarization diversity if the antennas are not parallel). Yes it is widely used, particularly for reception of rtty/data signals on HF. Most larger Navy ships make extensive use of space diversity with multiple receive whips located fore and aft feeding radios tuned to the same rtty signals.

And in the era (now long gone by) of extensive use of HF rtty to transmit information to and from fixed stations most installations had multiple antennas and receivers so diversity could be used. Both two

and four way diversity was common.

Troposcatter systems almost always use extensive diversity reception gear with simultaneous polarization, frequency and space diversity often being used on the same link. Multiway combiners used are often at least four or even 16 way.

And as I mentioned early many VHF/UHF repeaters use the technique to reduce the impact of flutter fading from moving mobiles. There are even some very fancy high end car FM radios that have two antennas and use diversity to reduce the impact of multipath fading on fm stereo reception.

And lots of ordinary microwave links (which are subject to fading from various tropospheric propagation effects) use space diversity with multiple receivers and antennas (look at a microwave tower and notice that many have two or more identical dishes pointed in exactly the same direction which often indicates diversity is in use).

So in answer to your question, no, diversity has not been made obsolete for HF by SSB. It is most often used with data signals and is not often used with SSB voice (because of the phasing problems I mentioned earlier), but in general diversity is alive and well.

David I. Emery - N1PRE - Lexington Mass.

Former senior technical consultant (and currently unemployed drunken bum)
Internet: jjmhome!pig!die@transfer.stratus.com (preferred) or die@world.std.com
UUCP: ...uunet!stratus.com!jjmhome!pig!die Phone + fax: 1+(617)-863-9986

Date: Fri, 20 Aug 1993 00:32:17 GMT
From: mustang.mst6.lanl.gov!nntp-server.caltech.edu!elroy.jpl.nasa.gov!sdd.hp.com!
nigel.msen.com!spool.mu.edu!sol.ctr.columbia.edu!news.kei.com!news.oc.com!
spssig.spss.com!@hub.ucsb.edu
Subject: ARRL DX Bulletin 044
To: info-hams@ucsd.edu

B DX @ ARL \$ARLC AE70
QST de W1AW DX Bulletin 44 ARLD044 From ARRL Headquarters
Newington CT August 20, 1993 To all radio amateurs

MELLISH REEF. During the three to four day trip aboard
te schooner Ninato the
reef, DXpedition operators will be active as VK4CRR/MM on
7180 and 14195 kHz. Activity from the 19 to 28. Thanks VK4CRR, WA4DAN,
W5KNE and QRZ

DX.

MOUNT ATHOS. JA3MNP and SV2WT are now active. SV2BES was heard on 18120 kHz at 1955z. Thanks W2MIG, K4CEF, N4VZ, KI5GF, W5KNE and QRZ DX.

LIBYA. The now not-so-recent five day activation of Libya by Romeo, EK0RR; Danny, LZ2UU; and Said, 5A0RR; netted some 11,000 QSOs. Copies of the log are in Bulgaria and QSLs are being sent. Said, a Libyan national, will continue to operate as 5A0RR. The call sign is in effect for two years. Said is primarily a CW op but may operate SSB from time to time. Thanks W1GG, WB2DHY and NT2X.

SAINT PAUL ISLAND. Yet another DXpedition is planned, this time for the first week of September by VE3MRN, VE3VQL and VE3CRG. The group will operate from the north island using the call sign CY9R. Thanks VE3VQL, W5KNE and QRZ DX.

CALL SIGN CONFUSION. The XE0 prefix is being issued to Novice licensees in Mexico. Their operating segments on HF are 7000 to 7050 kHz CW and 7050 to 7100 kHz LSB. Thanks XE1MD, W5KNE and QRZ DX.

ERITREA. The DX Advisory Committee, DXAC, vote on the DXCC status of Eritrea is scheduled for August 30. If you have an opinion one way or the other on this matter, contact your DXAC representative.

TOP TEN LIST. The ARRL DXCC Desk has developed a 'need list' based upon actual counts of countries credited to DXCC Awards. From the most wanted, they are Peter One Island, Yemen, Bhutan, Heard Island, Libya, Bangladesh, Tromelin Island, the Andaman and Nicobar Island groups, Glorioso and the Penguin Islands. For more information on this list, check the How's DX column in September QST.

THIS WEEKEND ON THE RADIO. The seventh ARRL 10 GHz Cumulative Contest will be held from 8am to 8pm local time this Saturday and Sunday, and the weekend of September 18 and 19. See page 113 of June QST for more information.

Contest Corral on page 110 of July QST details the following activities for the weekend.

TheSEANET Phone Coarts at
0000z August 21. Exchange signal report and serial

number, starting with 001 on each band.

The phone weekend of the North American QSO Party, sponsored by the National Contest Journal, will be from 1800z Saturday through 0600z Sunday. The exchange is operator name and state/province/DXCC country, as appropriate.

The New Jersey QSO Party, runs from 2000z Saturday to 0700z Sunday. The exchange is signal report, serial number and NJ county/ARRL section/DXCC country, as appropriate.

There are three operating periods for the SARTG Worldwide RTTY Contest. They are from 0000 through 0800z and 1600z through 2400z August 21, and 0800z through 1600z on August 22. Limit operating to 80, 40, 20, 15 and 10 meters. Exchange RST and QSO number.

NNNN

/EX

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Marc B. Grant, N5MEI	marcbg@feenix.metronet.com	214/231-3998 (voice)
P.O Box 850472	marcbg@esy.com	214/231-0025 (fax)
Richardson, TX 75085		

Date: Thu, 19 Aug 93 13:14:02 PDT

From: netcomsv!netcom.com!netcomsv!cruzio!brettb@decwrl.dec.com

Subject: A strange thing that happens when you are learning code

To: info-hams@ucsd.edu

> I had a full-blown
> case of CW on the brain. I wonder if I am going to hear
> beeping sounds as letters from now on, whether I want to or
> not?

Believe it or not, I've experience the same kind of thing as a no-code tech. After six hours of hypercard programming, I've gotten out on the highway (Highway 1 in this case) and all the cars rolling by looked like Icons...tunnel vision and all. They even made those funny little beeping sounds...now my insurance rates will probably go up again!

Terminally no-code, de KC6UPU. ;@}

--

Arthur Brett Breitwieser C.H.T.
Fedele d'amore, La Madonna Intelligenza Convivium
brettb@cruzio.santa-cruz.ca.us, KC6UPU@N0ARY (packet), Grid Loc CM86XXX
"Virgo prudentissima quae progredieris
quasi aurora valde rutilans,
Filia Sion, tota formosa et suavis es,
pulchra ut luna, electa ut sol."

Date: 19 Aug 93 21:33:51 GMT
From: rocksanne!aladdin!chen@cs.rochester.edu
Subject: Connectors? UHF NMO N PL-259/SO-239 ...
To: info-hams@ucsd.edu

I recently thought of reusing my old cb mag mount and buying a nice VHF or UHF antenna for it, but I'm not sure of the type of connector it is. It looks like a cross between a PL-259 and a SO-239. It has threads on the outside, but there's also a pin in the center of the connector. Is this a standard connector/mounting?

Can someone also briefly describe what a UHF, NMO, and N type connector look like?

Thanks!
Dan N2PKE

Date: 21 Aug 93 01:01:16 GMT
From: news-mail-gateway@ucsd.edu
Subject: Daily Solar Geophysical Data Broadcast for 19 August
To: info-hams@ucsd.edu

!!BEGIN!! (1.0) S.T.D. Solar Geophysical Data Broadcast for DAY 231, 08/19/93
10.7 FLUX=091.7 90-AVG=104 SSN=043 BKI=4333 1232 BAI=013
BGND-XRAY=A7.6 FLU1=1.2E+06 FLU10=1.2E+04 PKI=4333 2233 PAI=013
BOU-DEV=048,025,035,034,008,012,021,018 DEV-AVG=025 NT SWF=00:000
XRAY-MAX= B6.2 @ 0820UT XRAY-MIN= A5.4 @ 2041UT XRAY-AVG= B1.1
NEUTN-MAX= +003% @ 1105UT NEUTN-MIN= -003% @ 0735UT NEUTN-AVG= +0.1%
PCA-MAX= +0.1DB @ 1415UT PCA-MIN= -0.2DB @ 0125UT PCA-AVG= -0.0DB
BOUTF-MAX=55376NT @ 2224UT BOUTF-MIN=55325NT @ 1711UT BOUTF-AVG=55355NT
GOES7-MAX=P:+000NT@ 0000UT GOES7-MIN=N:+000NT@ 0000UT G7-AVG=+074,+000,+000
GOES6-MAX=P:+114NT@ 0452UT GOES6-MIN=N:-071NT@ 2058UT G6-AVG=+096,-012,-051
FLUXFCST=STD:090,090,090;SESC:090,090,090 BAI/PAI-FCST=010,005,010/010,007,007
KFCST=2233 4322 2223 3222 27DAY-AP=007,005 27DAY-KP=3221 2112 1112 1221
WARNINGS=
ALERTS=
!!END-DATA!!

NOTE: The Effective Sunspot Number for 18 AUG 93 was 41.5.
The Full Kp Indices for 18 AUG 93 are: 3o 4- 4- 4o 4- 3o 3- 3-

Date: 19 Aug 93 15:40:06 GMT
From: pravda.sdsc.edu!news.cerf.net!usc!howland.reston.ans.net!noc.near.net!
transfer.stratus.com!jjmhome!pig!die@network.ucsd.edu
Subject: FCC Collins 851S-1 and 851S-2 receivers
To: info-hams@ucsd.edu

In article <1203@pig.UUCP> jjmhome!pig!die@transfer.stratus.com writes:
>
> The unit
>
> I recently acquired a FCC surplus Collins 851S-1 receiver

Sorry that should be 851S-2. The radio is a 851S-2, the manuals
I have are for an 851S-1. The difference seems to be that the S-2
tunes in 1 hz steps.

Date: 19 Aug 93 05:50:41 GMT
From: dog.ee.lbl.gov!overload.lbl.gov!agate!howland.reston.ans.net!noc.near.net!
transfer.stratus.com!jjmhome!pig!die@network.ucsd.edu
Subject: FCC Collins 851S-1 and 851S-2 receivers
To: info-hams@ucsd.edu

The unit

I recently acquired a FCC surplus Collins 851S-1 receiver once
used by the FCC in Florida from an ad in the local want ad paper. It is
a 19 inch rack mounted fully synthesized 15 khz to 30 mhz HF CW/SSB/AM
receiver tunable in 1 hz steps that was built in 1981. Frequency display
is on orange LED digits with adaptive variable rate tuning via a large spinner
knob. The unit has a synthesized BFO offsetable in 1 hz steps from 0 to
9999 hz (the offset is displayed in LEDs), and has a built in speaker
as well as the usual headphone and 600 ohm line outputs.

As the FCC bought them, they seem to have 6 khz, 3 khz, 1 khz
500 hz and 200 hz symetrical mechanical filters, and 2.4 khz USB and LSB
filters. The unit will support ISB operation, but may not have the
card installed. The FCC version seems to use half octave RF front
end filters.

The unit has a black front panel with the displays and LED mode
indicators under smoked plexiglass. There is an incandescent lamp

illuminated S/audio level meter on the the left hand side with standard ham S units and dbuv scales. The tuning knob is on the right.

The receiver can be computer controlled, but unfortunately the FCC seems not to have installed that option in my unit. Control is via a serial port.

The synthesizer is a decade mix and divide design typical of early 70's pre-variable radix IC synthesizers. Collins quotes 2 ms settling time and seems to have included provisions for frequency hopping at a 100 hz or so rate via the serial port. Lord know what kind of phase noise it has, but some similar designs (eg Fluke) from that era were pretty respectable. The receiver conversion scheme is up from HF to 109 mhz first IF and then a 9 mhz second IF and 450 khz third IF.

The questions

1. Is anyone familiar with these radios ? How many were made and who used them ? The spooks (NSA and associated military security services) seem to have been using Racal HF receivers in this era; some of those radios are beginning to show in surplus. So who used the Collins units (obviously at least one was used by the FCC) ?

2. How long did the FCC use them ? and for what ?

3. Is there someone out there who has used one ? How did they compare in performance to the Racals ? What are their strengths and weaknesses ? The Racal units seem to be a much more modern design (allege to use DDS for example), why did Collins lag behind with such an old design ?

4. Does anyone know of sources of the remote control boards ?

5. Where does one get spare parts ?

6. Are there collectors who are interested in these radios ? Have others appeared in surplus ? Are they worth keeping or just selling to a Collins collector ?

David I. Emery - N1PRE - Lexington Mass.

Former senior technical consultant (and currently unemployed drunken bum)
Internet: jjmhome!pig!die@transfer.stratus.com (preferred) or die@world.std.com
UUCP: ...uunet!stratus.com!jjmhome!pig!die Phone + fax: 1+(617)-863-9986

Date: Thu, 19 Aug 1993 21:15:16 GMT
From: spsgate!mogate!newsgate!nuntius@uunet.uu.net
Subject: If I call FCC, cab they tell me what my new call is?
To: info-hams@ucsd.edu

In article <willmore.745770473@metropolis.gis.iastate.edu> David Willmore, willmore@iastate.edu writes:
>>Please don't call the FCC. It only slows down the process since instead
>>of processing applications, they must answer phones. Please help them
>>upgrade their system by not slowing them down.

How will the FCC know how absolutely disgusted everyone is with their third world handling of licenses if no one calls them. They probably think that they are doing a good job (they are part of the government after all).

Date: Thu, 19 Aug 1993 23:32:12 GMT
From: psinntp!gdstech!gdstech!bat@uunet.uu.net
Subject: I NEED HELP!!! I tried fixing a 02AT and made it worse!!!
To: info-hams@ucsd.edu

Last year I had my Icom HT fixed by Icom in Atlanta. They did a superb job, and fixed the radio the day after it arrived. Shipping was quick, I had it back 7 days after I mailed it! Try 206-454-7619.

--

* Pat Masterson D12-25 | KE2LJ@KC2FD ** Grumman Data Systems | 516-346-6316. ** Bethpage, NY 11746 | bat@gdstech.grumman.com *

Date: Fri, 20 Aug 1993 01:40:57 GMT
From: nntp.ucsb.edu!mustang.mst6.lanl.gov!nntp-server.caltech.edu!
elroy.jpl.nasa.gov!sdd.hp.com!usc!howland.reston.ans.net!newsserver.jvnc.net!
yale.edu!news.yale.edu!ewing@network.ucsd.edu
Subject: Phase Linked retransmissions
To: info-hams@ucsd.edu

Mike Linnig (linnig@m2000.dseg.ti.com) wrote:
: Forgive the wild hare nature of this...

: Has anyone ever linked multiple ham transmitter sites together so that

: they form a phased array antenna? I'm talking about sites
: significantly far apart -- say as much as a mile.

Sure you could do it, but the antenna pattern is all "sidelobes" unless
you have a carefully designed layout of transmitting antennas. The
angular spacing (radians) of the lobes is wavelength/baseline (give or take
factors of 2) if you only have one baseline. You have to add up many
different length baselines to cancel out all response except the desired
single lobe.

...

: This idea occurred to me after looking at some military phased array radars
: and I wonder if anyone ever did it at HF.
MHz range, at least. One of the first big telescopes was the Mills

Receiving arrays for radio astronomy have certainly done this down to the
20 MHz range, at least. The first big telescopes were linear arrays of
dipoles in the 80 - 400 MHz range.

Check out the Very Long Baseline Array (VLBA) which is to be dedicated
tomorrow in Socorro, NM. It "phases" 10 85-ft dishes spread out from
Hawaii to St Croix. (But to get decent antenna patterns on celestial
objects, you have to integrate over 12 hours to let earth rotation change
your effective baselines.) Effective beam size down to milli arc seconds.

: -- Mike, N5QAW

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: - - - - - + - - - - - +  
: Mike Linnig, Texas Instruments Inc. | 97.43% of all statistics are made |  
: Phone: (214) 575-3597                | up; most of them (83.6 percent) |  
: Internet: mike.linnig@dseg.ti.com    | are wrong.                |  
: - - - - -
```

Martin, AA6E ewing-martin@yale.edu
Yale Univ. Science & Engineering Computing Facility

Date: Thu, 19 Aug 1993 23:49:03 GMT
From: psinntp!gdstech!gdstech!bat@uunet.uu.net
Subject: QSL routes needed
To: info-hams@ucsd.edu

9K2DI goes to Lonny, KA9WON.

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*-----*  
*     Pat Masterson   D12-25   | KE2LJ@KC2FD                   *  
*-----*
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* Grumman Data Systems | 516-346-6316. *
* Bethpage, NY 11746 | bat@gdstech.grumman.com *

Date: 19 Aug 93 12:58:54 CDT
From: news.acns.nwu.edu!math.ohio-state.edu!howland.reston.ans.net!agate!msuinfo!
uchinews!raistlin!timbuk.cray.com!walter.cray.com!rps@network.ucsd.edu
Subject: TR 18 rotator?
To: info-hams@ucsd.edu

Looking for information.

Did CDE ever make a TR 18 rotator?

I picked up the old rotator without a control box, It looks much like a
a hy-gain CD-45. I heard that CDE (the rotator company Hy-gain purchased)
made a TR-20 sometime ago. I'm sure this is a pretty old rotator and most
likely this one is older than the TR-20's. I opened this thing up and it
is in perfect condition. It has 8 wires much like the CD45's and the HAM,
and tailtwiter rotators. The Gears are in perfect shape, and the only
Identification it has is in on the ring gear "TR 18". It's a bell shape
rotator and seems to hold up well, It sat up on a tower for about 20 years.

It doesn't have a huge break on it however (A bump on the bottom, like the
HAM and T2X rotators). I plan on using it to rotate UHF/VHF beams so I
don't think having a small break will be a problem.

Thanks!

--
/_)_ Russ Starksen ,,, Fax: (612) 683-3699
/_/_/_/_/_/_)_ rps@cray.com (.~.) phone: (612) 683-3635
-...-. -----o00--(_)--00o----- NOMRR @ KB0GF.MN.USA.NOAM

Date: Thu, 19 Aug 93 22:17:03 GMT
From: nevada.edu!jimi!equinox!arthurj@uunet.uu.net
Subject: VE session(s) in Tucson, AZ?
To: info-hams@ucsd.edu

End of Info-Hams Digest V93 #997
